CLAIMS

I claim:

1. An optical transmission controller, comprising:

a temperature controller, operative to digitally control the temperature of a laser module;

a modulator bias controller coupled to digitally control the DC voltage levels applied to an optical modulator; and

an optical power controller, operative to digitally control an output power of the optical modulator.

2. The controller of claim 1, wherein the temperature controller includes

a temperature detection circuit to receive signals from a temperature detector in the laser module and provide a temperature signal;

a temperature control circuit coupled to receive the temperature signal from the temperature detection circuit and provide a control signal; and

an output driving circuit coupled to receive the control signal and provide a driving signal.

3. The controller of claim 2, wherein the temperature detection circuit receives signals from a thermistor placed in the laser module.

4. The controller of claim 2, wherein the output driving circuit provides the driving signal to a thermo-electrical-cooler (TEC) placed in the laser module.

5. The controller of claim 2, wherein the temperature control circuit compares the temperature signal with a pre-determined setting in a proportional-integral-differential control algorithm to determine the control signal.

6. The controller of claim 5, further including a wave-length controller, comprising:

a wavelength receipt circuit coupled to receive signals related to the wavelength of light output by the laser module and generate a wavelength signal;

a wavelength control circuit coupled to the wavelength receipt circuit, the wavelength control circuit comparing the wavelength signal with a predetermined wavelength signal to generate a control signal; and

a temperature determination circuit coupled to select the predetermined signal in response to the predetermined wavelength signal.

7. The controller of claim 1, further including a laser current circuit to provide a settable amount of current to a laser diode in the laser module.

8. The controller of claim 1, wherein the optical power controller comprises:

a power monitoring circuit that generates a power signal in response to a signal related to the optical power;

a power control circuit that generates a power control signal in response to a comparison between the power signal and a selectable power signal; and

a power driver that generates a power driving signal in response to the power control signal.

9. The controller of claim 8, wherein the power driving signal controls a variable optical amplifier.

10. The controller of claim 8, wherein the signal related to the optical power originates from a photodiode sampling a portion of an optical output from the modulator.

11. The controller of claim 1, wherein the modulator bias controller comprises:

a dither signal generating circuit that generates at least one dither signal;

a dither signal buffering circuit to provide the at least one dither signal to a modulator;

an optical power detection circuit that generates a power signal related to the optical power output from the modulator;

at least one bandpass filter to receive the power signal and recover feedback signals related to components of the power signal having frequencies of the at least one dither signal;

a signal processing unit to detect drift in the bias voltage from the feedback signals; and

a bias voltage driving circuit coupled to provide DC voltages to the modulator.

12. The controller of claim 11, wherein the dither signal is applied to the DC voltage to the modulator.

13. The controller of claim 11, wherein the dither signal is applied to an RF driving voltage to the modulator.

14. The controller of claim 11, wherein the at least one dither signal includes dither signals applied to a plurality of modulators.

15. A method for controlling a modulator bias of a Mach-Zehnder interferometer, the method comprising:

generating a dither signal and summing the dither signal with the DC bias voltage for input to the DC input port of the Mach-Zehnder interferometer;

receiving a signal related to optical output power from the Mach-Zehnder interferometer;

detecting bias drift information from a frequency component of the signal related to the frequency of the dither signal; and

generating a DC bias voltage signal in response to the drift information.

16. A method for controlling a modulator bias of a Mach-Zehnder interferometer, the method comprising:

generating a dither signal and summing the dither signal with an automatic gain control signal to control an RF signal applied to the Mach-Zehnder interferometer;

receiving a signal related to optical output power from the Mach-Zehnder interferometer;

detecting bias drift information from a frequency component of the signal related to the frequency of the dither signal; and

generating a DC bias voltage signal in response to the drift information.

17. A optical transmission controller, comprising:

means for controlling a laser module; and

means for controlling a modulation module that is coupled to the laser module.

18. The controller of claim 17, wherein the means for controlling a laser module comprise:

means for controlling a temperature of the laser module;

means for controlling an optical wavelength output by the laser module; and

means for controlling a current supplied to a laser diode in the laser module.

19. The controller of claim 17, wherein the means for controlling the modulation module includes:

means for controlling a DC bias of at least one modulator in the modulation module; and

means for controlling an optical output power of the modulation module.